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1971 OPERATING SUMMARY

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PRESTON

WATER POLLUTION CONTROL PLANT

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1971

Preston : water pollution control plant.
81790

Water management in Ontario

Ontario
Water Resources
Commission

We are pleased to submit for your consideration a summary of operation during 1971 of the water pollution control plant serving your community.

This operating summary contains parameters normally used to measure plant performance and loading, as well as relevant cost data. Because of the concern over eutrophication of our lakes and of the requirement, in many parts of Ontario, to remove the major contributing factor, results of analysis for phosphorus appear in this summary.

D.S. Caverly,
General Manager.

D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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135 St. Clair Avenue West
Toronto 195

PRESTON

WATER POLLUTION CONTROL PLANT

operated for

THE TOWN OF PRESTON

by the

ONTARIO WATER RESOURCES COMMISSION

1971 ANNUAL OPERATING SUMMARY

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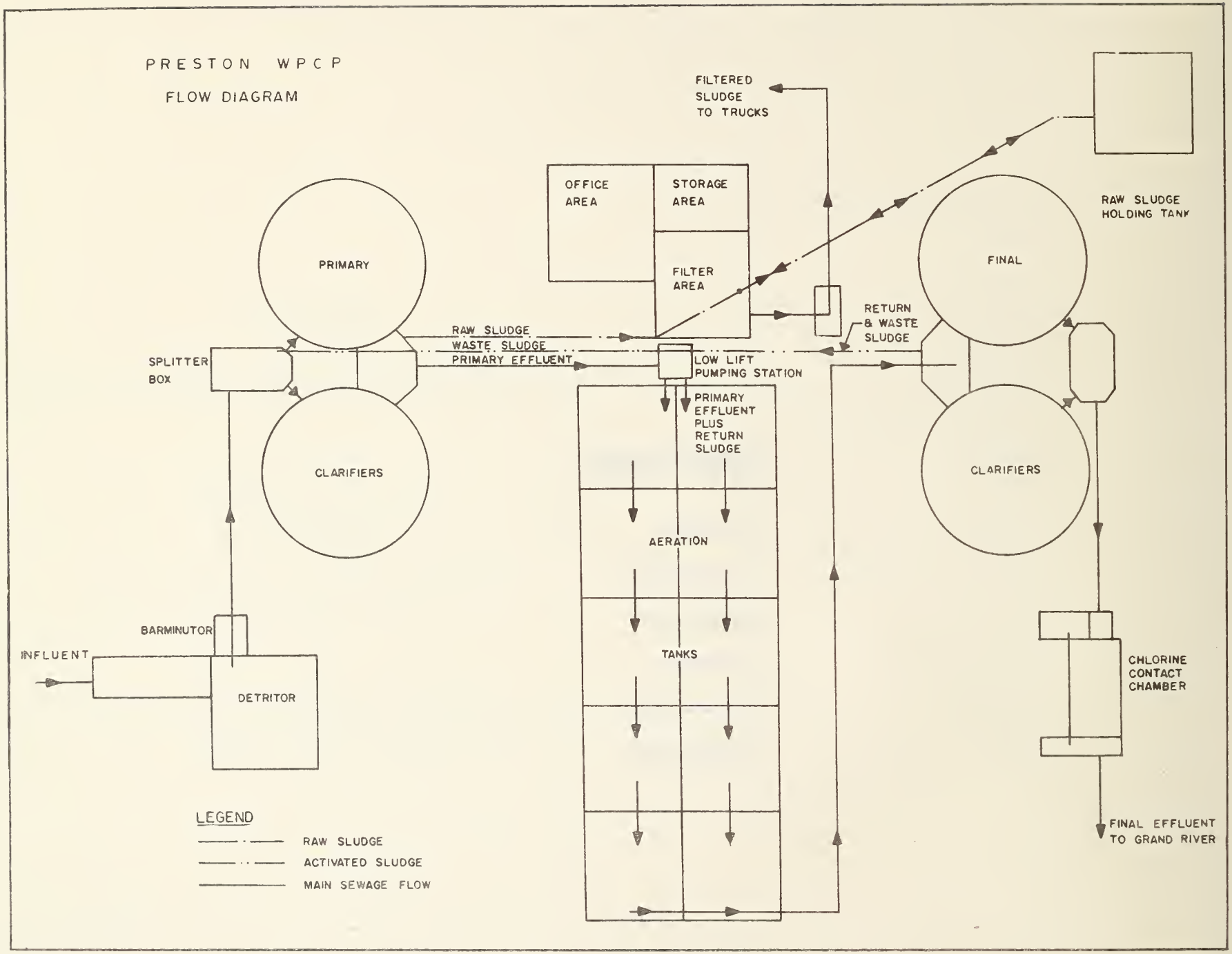

PRESTON WPCP
FLOW DIAGRAM
FILTERED SLUDGE TO TRUCKS
OFFICE AREA
STORAGE AREA
FILTER AREA
RAW SLUDGE HOLDING TANK
PRIMARY
FINAL
RETURN & WASTE SLUDGE
RAW SLUDGE
WASTE SLUDGE
PRIMARY EFFLUENT
SPLITTER BOX
LOW LIFT PUMPING STATION
PRIMARY EFFLUENT PLUS RETURN SLUDGE
CLARIFIERS
CLARIFIERS
AERATION
TANKS
BARMINUTOR
INFLUENT
DETRITOR
CHLORINE CONTACT CHAMBER
FINAL EFFLUENT TO GRAND RIVER
LEGEND
RAW SLUDGE
ACTIVATED SLUDGE
MAIN SEWAGE FLOW

DESIGN DATA

PROJECT NO.	2-0046-59
TREATMENT	Activated Sludge
DESIGN FLOW	1.8 mgd
DESIGN POPULATION	15,000
BOD - Raw Sewage	300 mg/l
- Removal	95%
SS - Raw Sewage	350 mg/l
- Removal	90%

PRIMARY TREATMENT

Grit Removal

Type: Dorr detritor
Size: One 20' x 20' x 1½' (3,740 gal)
Retention: 2.1 min

Comminution

Type: Barminutor
Size: Model C (36")

Primary Sedimentation

Type: Dorr
Size: Two 50' dia x 10' swd
(246,000 gal)
Retention: 3.3 hr
Loading: Surface, 460 gal/ft^2/day
Weir, 5730 gal/ft/day

Sewage Lift Pumps

Type: Worthington
Size: Two 1800 gpm @ 17.4' tdh

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical; single-pass
Size: Two 150' x 30' x 13'
(731,000 gal)
Retention: 9.8 hr

Aerators

- Ten Ames-Crosta

Secondary Sedimentation

Type: Dorr
Size: Two 50' dia x 10' swd
(246,000 gal)
Retention: 3.3 hr
Loading: Surface, 460 gal/ft^2/day
Weir, 5730 gal/ft/day

CHLORINATION

Type: F & P
Size: One 400 lb/day

Chlorine Contact Chamber

Size: One 30' x 15' x 6' 8"
(18,700 gal)
Retention: 15 min

OUTFALL

- to Grand River

SLUDGE HANDLING

Holding Tank

Size: One 20' x 20' x 11'
(4,400 cu ft or 27,400 gal)

Vacuum Filter

Type: Komline-Sanderson
Size: One 250 sq ft

'71 Review

GENERAL

The average daily flow for the year of 1.32 million gallons is a decrease of 0.08 million gallons from the 1970 average daily flows. In 1971 the plant treated a total of 484.3 million gallons of sewage at a total cost of $89,390.88. The operating cost per million gallons was $185.61 and the cost per pound of BOD removed was 2 cents while the cost of suspended solids removed was 1 cent.

During the summer months residents in the Town of Preston complained of odours being emitted from the plant property. Staff from the OWRC, MOH, Air Management Branch and municipal officials were involved in the investigation of the source of the odours. Operational changes were made and it is anticipated that this problem has been solved.

Throughout 1971 the plant experienced operational problems due to the incoming waste of either starch, grease, potato slices and/or heavy metals, especially copper, nickel and zinc. On various occassions the quantity of foam throughout the plant was very excessive.

PLANT FLOWS and CHLORINATION

The average daily flow of 1.32 million gallons was a decrease of approximately five percent from 1970. The daily design flow of 1.8 million gallons was exceeded approximately three percent of the time.

With the decrease in flow, the amount of grit removed decreased to a total of 1198 cubic feet or an average of 2.5 cubic feet per million gallons. The average dosage rate required to produce an average chlorine residual of 0.5 mg/l was 6.3 mg/l.

PLANT EFFICIENCY

The raw sewage BOD averaged 872 mg/l with the design raw sewage BOD concentration of 300 mg/l being exceeded 90 percent of the time.

The raw sewage suspended solids averaged 1,790 mg/l with the design raw sewage suspended solids of 350 mg/l being exceeded 100 percent of the time which is similar to the situation in 1969 and 1970.

The average raw sewage BOD content of 872 mg/l is approximately 280 percent of the design value an increase of 60 percent from 1970. The average suspended solids concentration of 1790 mg/l is approximately 540 percent of design value which is an increase of 170 percent from 1970.

The average BOD and suspended solids in the final effluent were
Reductions of 98 percent were experienced in both the BOD and suspended solids removal. Although the BOD and suspended solids reductions achieved was extremely good, the effluent still exceeded the OWRC objectives by 65 percent for BOD and 50 percent for suspended solids in 1971, an increase of 15 and 10 percent respectively from 1970. The decrease in final effluent quality is a result of the abnormally high organic strength of the raw sewage.

SLUDGE DISPOSAL

The high organic loading on the plant was reflected in the amount of sludge requiring disposal. A total of 8194 cubic yards of liquid sludge, approximately the same as in 1970 and 6370 cubic yards of sludge dewatered by vacuum filtration, an increase of 1448 cubic yards from the previous year, were hauled from the plant during 1971.

VACUUM FILTRATION

The average total raw sludge solids content was 8.8 percent while the average filtered solids content was 25 percent. The average dosage of lime was 10 percent and the average dosage of ferric chloride was 3.4 percent.

CONCLUSIONS and RECOMMENDATIONS

Despite the very high organic loading, substantially due to industry in the Town, the plant maintained a very high degree of efficiency during the year indicating excellent control of the plant process.

It is recommended that the Town of Preston keep a close surveillance on the industrial wastes discharged from its various industries to ensure that the organic discharge and heavy metal discharges are not greater than specified in the Town's bylaws and agreements.

Construction of the plant expansion is anticipated to start in 1972.

PROJECT COSTS

STAGE I NET CAPITAL COST (Final)	$147,617.75
DEDUCT - Portion financed by CMHC/MDLB (Final)	-
Long Term Debt to OWRC	$147,617.75
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1971	$ 43,834.83
Net Operating	$ -
Debt Retirement	1,273.00
Reserve	511.58
Interest Charged	8,280.00
TOTAL	$ 10,064.58

RESERVE ACCOUNT

Balance @ January 1, 1971	$ 9,343.87
Deposited by Municipality	511.58
Interest Earned	615.30
	$ 10,470.75
Less Expenditures	-
Balance @ December 31, 1971	$ 10,470.75

PROJECT COSTS

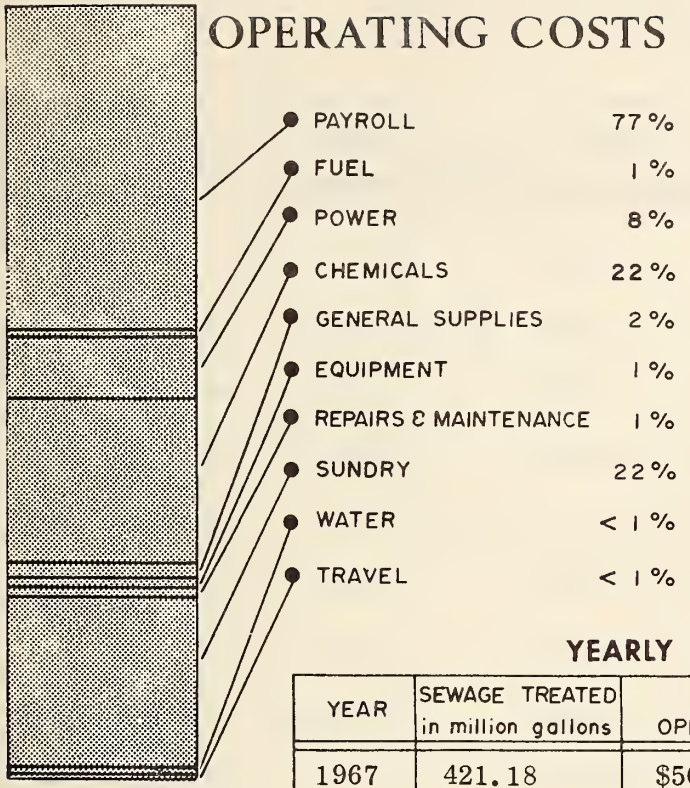
STAGE II NET CAPITAL COST (Final)	$647,993.44
DEDUCT - Portion financed by CMHC/MDLB (Final)	432,072.28
Long Term Debt to OWRC	$215,921.16
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1971	$ 47,903.82
Net Operating	$ 89,390.38
Debt Retirement	2,035.00
Reserve	2,959.74
Interest Charged	12,111.20
TOTAL	$106,496.82

RESERVE ACCOUNT

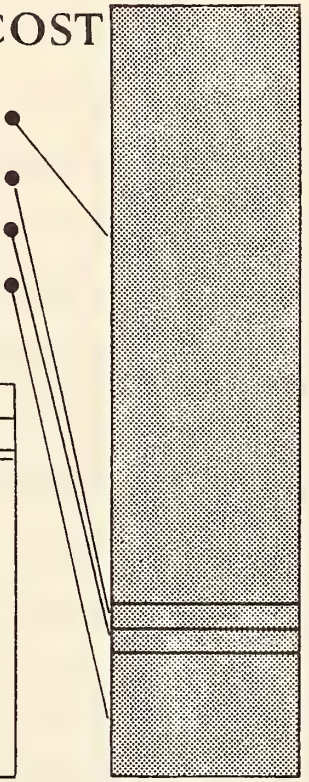
Balance @ January 1, 1971	$ 30,388.40
Deposited by Municipality	2,959.74
Interest Earned	2,036.89
	$ 35,385.03
Less Expenditures	-
Balance @ December 31, 1971	$ 35,385.03

1971 COSTS

OPERATING COSTS



TOTAL ANNUAL COST



YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS	
			$ per million gal	¢ per lb BOD
1967	421.18	$50,152.64	$119.08	3 cents
1968	547.38	61,420.06	112.21	3 cents
1969	479.3	62,603.47	130.61	2 cents
1970	494.5	77,746.48	157.20	2 cents
1971	484.3	89,390.88	185.00	2 cents

MONTHLY OPERATING COSTS

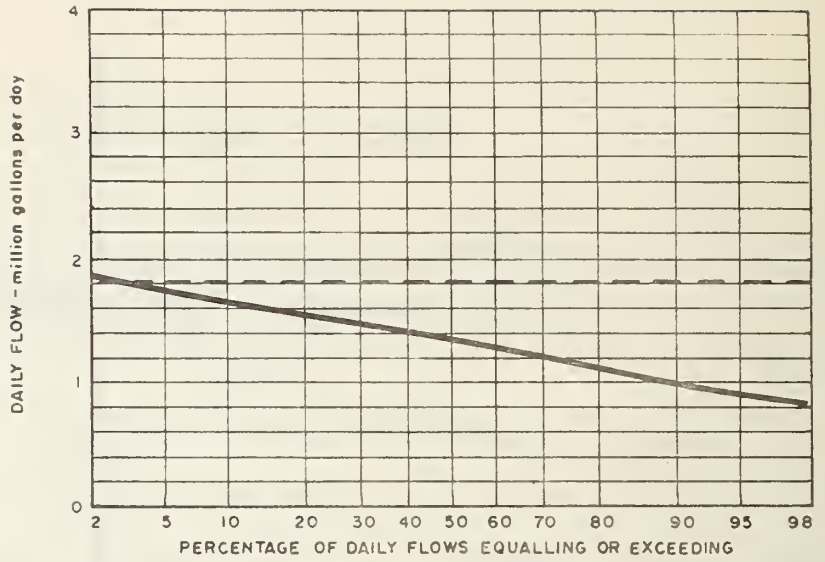
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	3420.34	2441.99	-	130.54	593.66	-	156.69	-	-	-	63.71	33.75
FEB	9481.79	3629.08	-	121.00	-	4065.32	91.65	16.95	282.71	1241.63	-	33.45
MAR	9074.85	2440.70	-	131.02	558.65	2161.74	80.65	-	64.86	3637.23	-	-
APR	7598.94	2465.55	-	78.23	1172.25	2026.92	142.72	-	482.93	1119.42	83.92	27.00
MAY	7317.42	2454.00	335.18	-	536.57	464.20	1525.79	173.22	145.20	1548.53	79.98	54.75
JUNE	7437.70	2733.96	122.48	109.23	618.51	448.48	126.64	-	1152.95	2059.25	36.35	29.85
JULY	6150.54	2447.06	370.74	-	670.17	-	82.71	-	60.65	2483.81	-	35.40
AUG	4052.35	2515.85	338.36	49.13	614.82	1055.23	40.09	-	(756.03)	122.21	72.69	-
SEPT	8207.44	2466.80	323.78	-	624.04	1890.00	106.83	-	-	2728.39	-	67.60
OCT	7516.21	3943.17	-	-	651.72	3843.67	(1217.98)	142.19	56.86	20.99	75.59	-
NOV	7286.36	3704.85	-	16.80	629.58	1078.15	113.64	488.74	67.12	1153.13	-	34.35
DEC	11846.94	4071.03	-	96.79	678.00	2553.76	183.26	36.75	145.78	4008.46	73.11	-
TOTAL	89390.88	35314.04	1490.54	732.74	7347.97	19587.47	1432.69	857.85	1703.03	20123.05	485.35	316.15

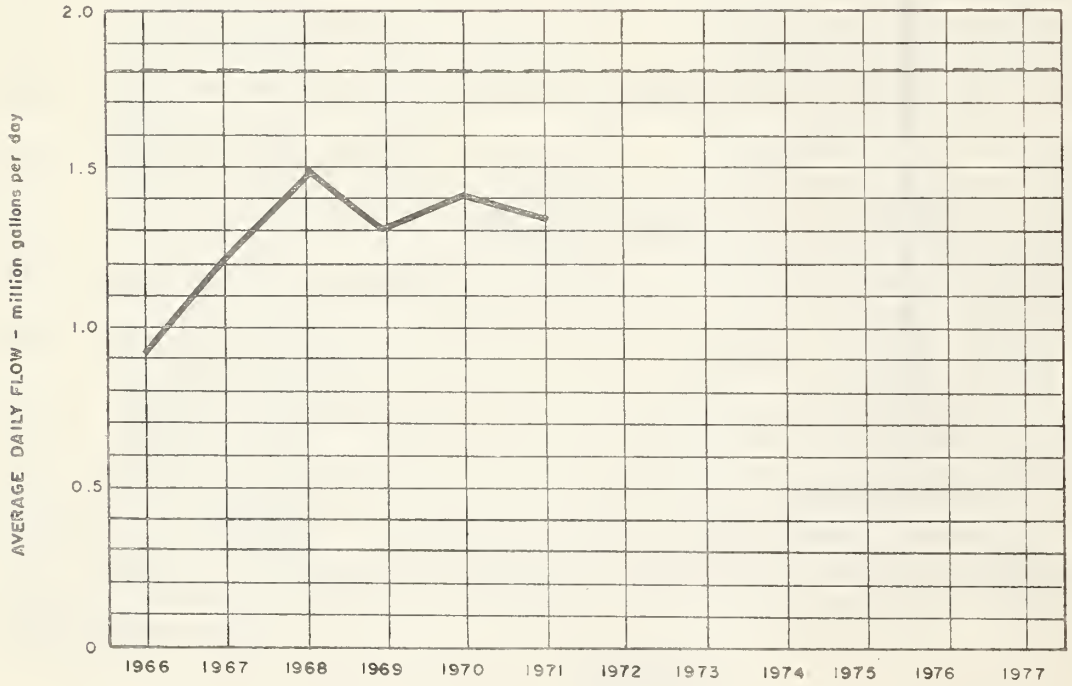
Brackets indicate credit.

* Sundry includes sludge haulage costs of $ 7,164.90
10,510.50

PROCESS DATA

FLOWS



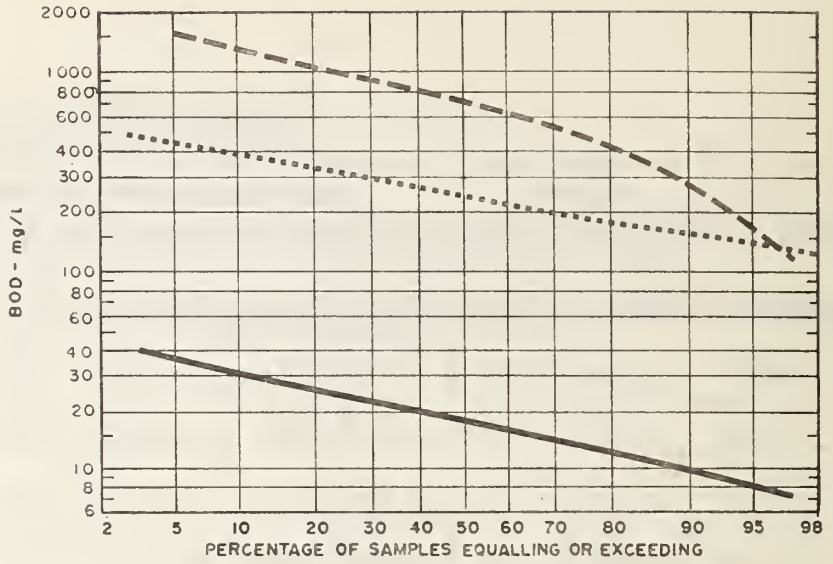


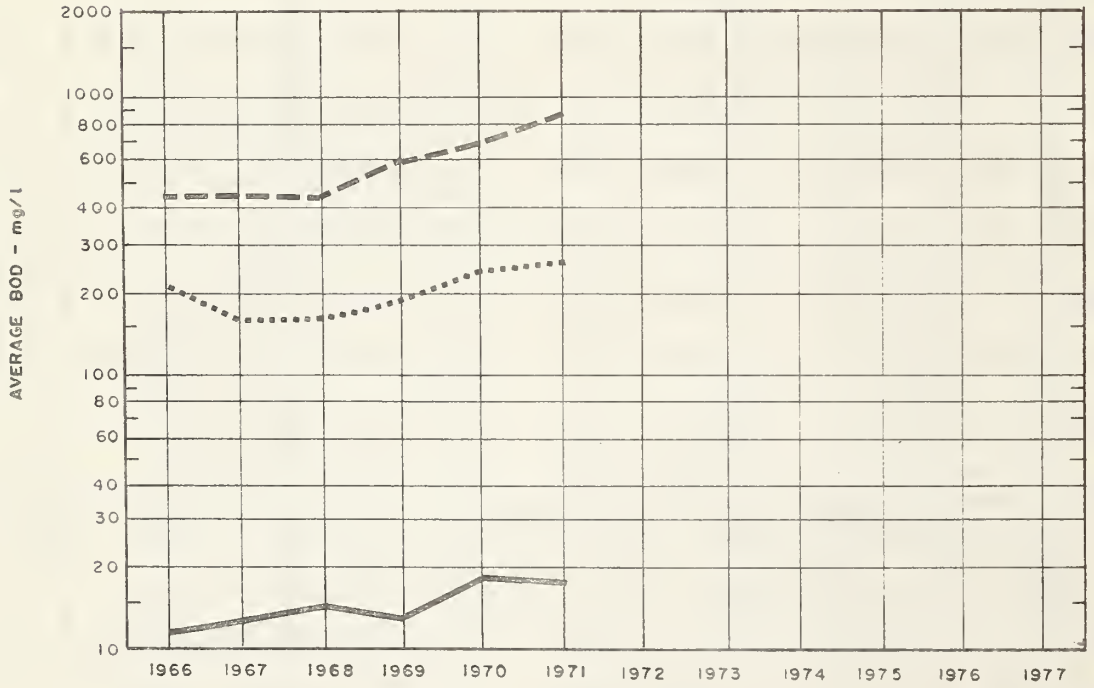
DESIGN CAPACITY _ _ _ _ _ _ _ _

PLANT PERFORMANCE

MONTH	FLOWS				BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				TOTAL PHOSPHORUS		
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	MAXIMUM RATE	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDN
	million gallons	mil gal	mil gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l as P	mg/l as P	%
JAN	40.6	1.31	1.7	2.4	676	21	97	270	1332	18	99	530	12.7	.9	93
FEB	41.9	1.50	1.9	2.9	895	12	99	370	3838	12	99+	1600	17.6	2.9	83
MAR	48.9	1.58	2.3	4.8	757	11	99	360	1402	13	99	680	18.0	4.2	77
APR	47.2	1.57	2.0	4.6	758	60	92	330	1195	38	97	550	-	-	-
MAY	42.7	1.38	1.6	4.0	918	25	97	380	1826	21	99	770	20.0	8.4	64
JUNE	40.6	1.35	1.6	4.0	1326	12	98	540	2850	12	99	1160	18.0	6.9	62
JULY	35.2	1.14	1.7	6.2	715	24	97	240	1050	24	98	360	14.0	6.5	54
AUG	36.3	1.17	1.8	5.5	881	14	98	310	1107	13	99	400	14.0	5.1	64
SEPT	36.9	1.23	1.5	4.8	1509	17	99	550	1255	21	98	450	28.0	5.8	79
OCT	37.5	1.21	1.5	4.1	919	10	99	340	2045	10	99	760	16.4	4.0	76
NOV	36.9	1.19	1.4	4.3	742	13	98	270	1211	17	98	440	16.0	7.2	55
DEC	39.6	1.27	1.7	4.8	720	19	97	280	1239	23	98	480	21.5	6.7	69
TOTAL	484.3	-	-	-	-	-	-	4240	-	-	-	8180	-	-	-
AVG.	-	1.32	MAXIMUM 2.3	MAXIMUM 6.2	872	18	98	353	1790	18	98	682	17.8	5.3	70
No. of Samples	-	-	-	-	141	151	-	-	242	235	-	-	58	58	-

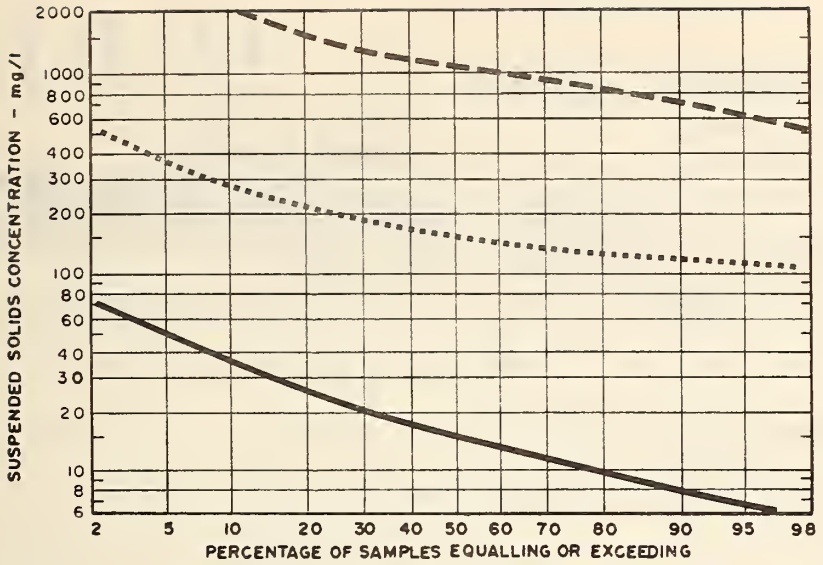
BIOCHEMICAL OXYGEN DEMAND

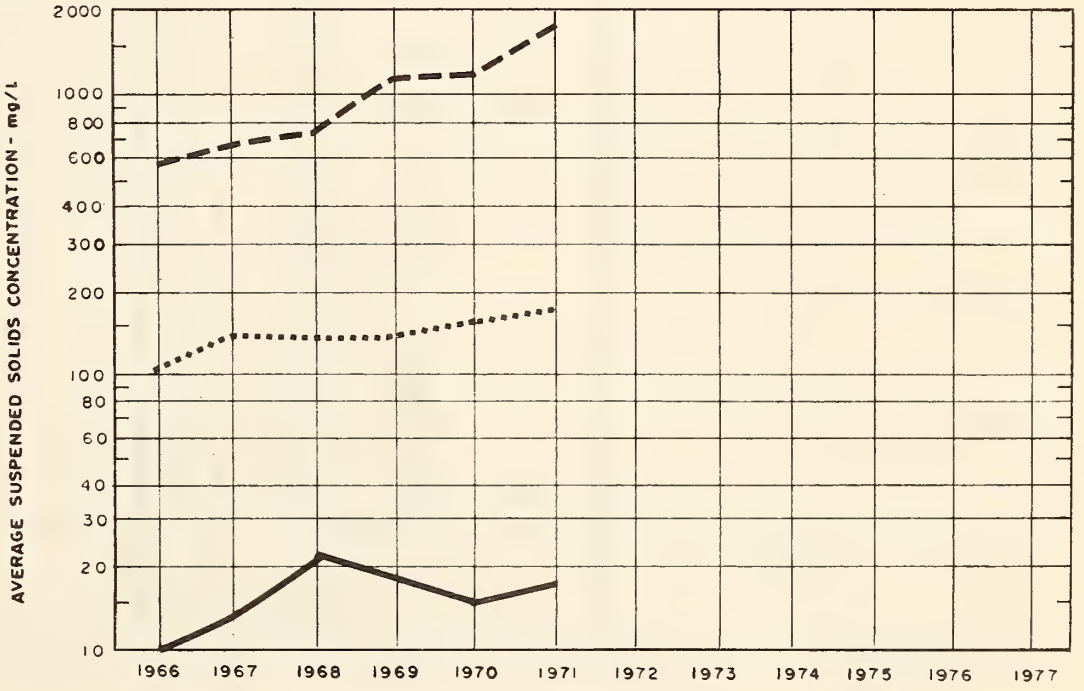




PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

SUSPENDED SOLIDS





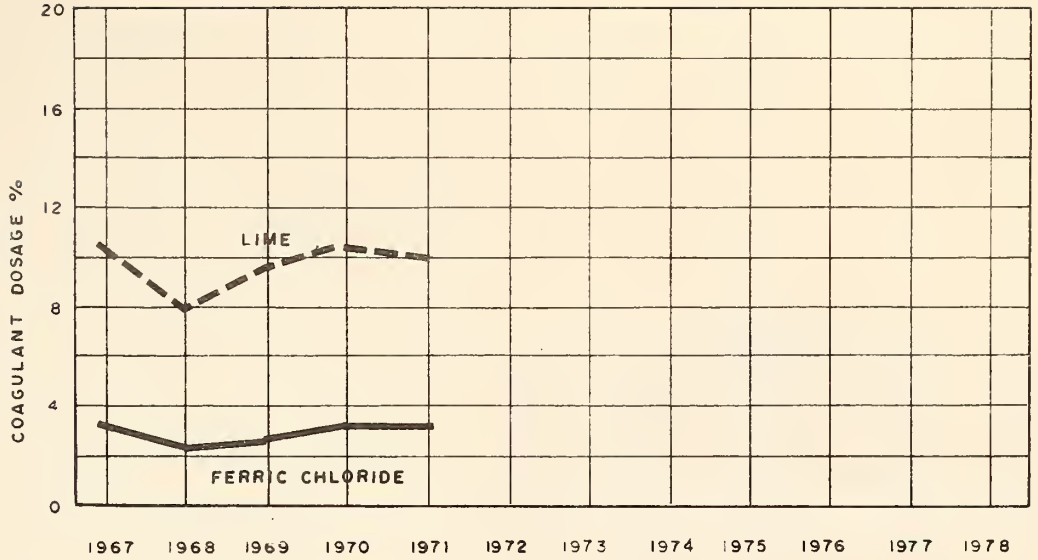
PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

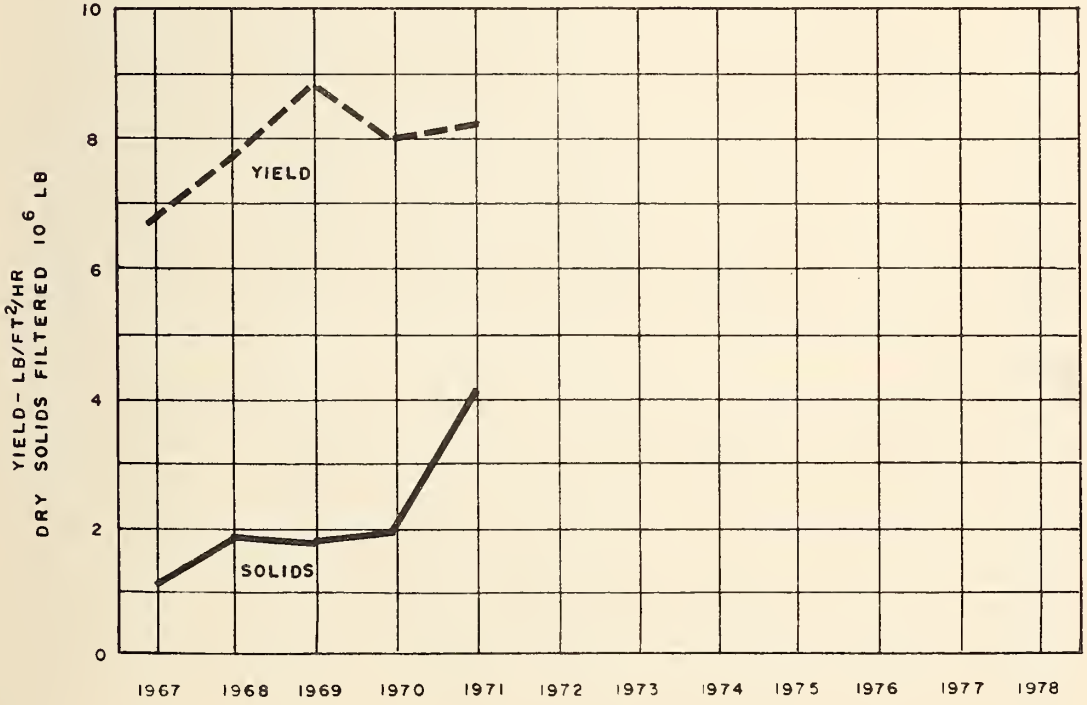
TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION		SLUDGE DISPOSAL								
								RAW SLUDGE		VACUUM FILTER OPERATION					HAULAGE	
	QUANTITY REMOVED cubic feet	Cl_2 USED 10^3 pounds	AVG. DOSE mg/l	BOD mg/l	SUSPENDED SOLIDS mg/l	MLSS CONC mg/l	F/M day^{-1}	TOTAL AMOUNT 10^3 gal	DRY SOLIDS %	SLUDGE FILTERED 10^3 lb	LIME as CaO 10^3 lb	$FeCl_3$ 10^3 lb	YIELD lb/ft^2/hr	CAKE % t.s.	Dewatered cu yd	Liquid cu yd
JAN	95	2.4	6.0	328	238	2200	.28	3.5	8.9	133	15	3.9	7.4	23	360	1364
FEB	88	2.4	5.7	311	200	2420	.28	4.4	8.6	133	15	4.1	7.6	24	350	1883
MAR	97	2.7	5.5	194	130	1690	.25	3.8	8.2	248	27	9.2	7.5	24	650	256
APR	89	2.6	5.5	230	138	3230	.16	2.7	10.4	217	24	10.4	8.0	27	560	403
MAY	25	2.5	5.8	236	140	2060	.22	4.3	8.8	197	18	5.5	9.1	24	510	1341
JUNE	97	1.6	5.1	263	142	1360	.37	3.5	8.9	150	25	8.2	8.3	25	650	624
JULY	128	3.0	7.7	215	139	1460	.24	2.4	9.7	228	21	5.7	8.6	27	570	250
AUG	140	2.4	6.6	195	135	1740	.18	3.4	7.3	239	22	6.9	8.0	28	570	179
SEPT	152	2.7	7.2	169	111	1950	.15	2.8	9.1	214	27	7.2	7.8	26	560	230
OCT	98	2.9	7.7	197	314	1740	.19	2.9	10.0	240	23	6.1	9.5	28	570	424
NOV	102	2.7	7.2	232	124	1790	.22	3.4	8.2	245	24	9.3	8.7	27	600	439
DEC	85	2.6	7.6	260	184	2110	.22	3.3	8.1	164	21	7.2	8.2	25	420	801
TOTAL	1198	30.5	-	-	-	-	-	40.8	-	2508	262	83.7	-	-	6370	8194
AVG.	2.5 cu ft/mil gal	2.5	6.3	250	175	2240	.23	3.4	8.8	209	10% *	3.4% *	8.2	25	531	683

* Average dosage - % by weight of dry solids.

VACUUM FILTRATION





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